the time of his arrival at Kong, — a period of six months and a half, — he must have traversed from seven hundred to a thousand miles. Judging from this fact, it would take him at least a year to complete his proposed tour from the city of Kong, and his return to the same. We must not be surprised at not having heard from him: that may be due to a lack of opportunity for sending messages.

Having given this description of the journey of Capt. Binger, we can but wish that it may terminate as well as it has begun.

GUSTAVE EIFFEL.

BEFORE proceeding to speak of the Eiffel Tower in detail, *Engineering*, in its issue of May 3, in which is a noteworthy survey of the opening Paris Exhibition, takes occasion to say a few words about Gustave Eiffel and his works. Born at Dijon in 1832, he passed brilliantly through the Ecole Centrale, and commenced the active pursuit of his profession in 1855. One of his first works was the completion of the foundations of the great railway-bridge of Bordeaux by means of compressed air,— a system then but little known in France. After this work, M. Eiffel constructed a large bridge over the Nive at Bayonne, and two others at Capdenac and at Florac.

In 1867 he was intrusted by M. Krantz, the commissioner-general of the Paris Exhibition of that year, with the task of checking experimentally the calculations made for the large buildings. In 1868 he constructed, under the direction of M. de Nordling, engineer of the Orleans Company, the viaducts with iron piers, upon the line between Commentry and Gannat. It was in these viaducts that he first employed the system consistently followed by him afterwards, of wrought-iron braced structures, instead of cast-iron columns or masonry piers. A little later he introduced, with great success, a system of launching bridges from their site of erection on the ground across the piers previously built to receive them. His first attempt in this direction was in 1869, with the Sioule viaducts, followed by another at Vianna, in Portugal, where iron girders more than 1,800 feet in length were launched into position. Then came the viaduct of Tardes, near Montluçon, which was launched at a height of 328 feet above the ground, over piers 340 feet apart.

M. Eiffel was the first among French engineers to employ the system of erecting bridges of great span without scaffolding, by building out the structure piece by piece. His first work of this class was at Cubzac, near Bordeaux, where he crossed a river with a bridge 236 feet span without any staging. At Tan-an, in Cochin China, he erected in a similar way a bridge of 262 feet span. Of arched bridges built in the same manner, the most important, until it was surpassed by the viaduct of Garabit, was the great bridge over the Douro, at Oporto, the central span of which is 534 feet, and the rise of arch 138 feet, the height of rails above the water-level being no less than 200 feet. But he surpassed himself in the Garabit viaduct, where an arch 541 feet span crosses the torrent of the Truyère 400 feet above it. Among the other great engineering works carried out by M. Eiffel must be mentioned the Pesth railway-station; the Szegedin bridge; the principal façade of the Paris Exhibition of 1878; and the dome of the Observatory at Nice, 75 feet in diameter, and weighing more than 100 tons, which floats within a circular trough, so that the effort required to move it is almost inappreciable. Scarcely less remarkable as an engineering work, and as a triumph of the founder's art, is the gigantic statue of Liberty, modelled by Bartholdi, and presented by France to the United States, where it now stands lighting the entrance to the harbor of New York.

The great series of locks which were to have formed a sort of giant staircase for the passage of ships across the Isthmus of Panama was elaborated as to design, and considerably advanced as to execution, when the great work collapsed. From the foregoing rapid sketch, it will be seen that few engineering constructors have carried out so many important and original works as M. Eiffel; and the success which has uniformly attended him was a guaranty for the stability and beauty of his latest effort, the Column of the Republic, and his own monument.

Of course, the idea of a tower of gigantic height is not a new one. Not to mention the efforts of the early engineers which had the unexpected result of inventing foreign languages, there are three better authenticated and more recent proposals than the instance in which the sons of men said, "Go to, let us build us a tower whose top may reach unto heaven, and let us make us a name." The earliest was that of the splendid but eccentric genius Trevithick in 1833; then came the proposal of the well-known American engineers, Messrs. Clarke & Reeves, who offered to construct for the Philadelphia Exhibition, in 1876, a tower, 1,000 feet in height, of wrought iron, and about 150 feet in diameter at the base. Finally, in 1881, a M. Sebillot proposed to light Paris electrically by a 1,000-foot tower.

Excepting the American project, none of these schemes had any practical value, but the proposal of Trevithick is worth referring to here. He suggested, in a letter published in the *Morning Herald* of July 11, 1832, that the passing of the Reform Bill should be commemorated by a gigantic tower made of cast iron, 1,000 feet in height, 100 feet in diameter at the base, and 12 feet in diameter at the top. It was to be set upon a stone plinth 60 feet high, and was to have a capital 50 feet in diameter, supporting a colossal statue. The shape was to be that of a cone, and an internal cylinder 10 feet in diameter was to run from the ground to the top of the structure. Trevithick proposed that the tower should be composed of 1,500 symmetrical segments, with internal flanges around their edges for bolting them together. Each segment was to be pierced with a large circular opening for lessening the weight and reducing the wind-pressure. The total weight was to be about 6,000 tons, and each of the cast-iron panels was to weigh about 3 tons. The contract price offered for the castings was £7 per ton, the total estimate of expense was under £80,000, and Trevithick undertook the erection of the column in a period not to exceed six months. Passengers were to be raised to the top of the tower in the central cylinder, which was to be fitted with a piston providing accommodation on its upper surface for twenty-five persons; and the piston was to be raised from the bottom to the top by compressed air forced into the cylinder, and controlled by suitable valves. Fortunately for the memory of Trevithick, this scheme remained upon paper.

The Eiffel Tower is the natural development of the class of work upon which its constructor has been occupied for so many years. It was the direct outcome of a series of investigations undertaken by M. Eiffel in 1885, with a view of ascertaining the extreme limits to which the metallic piers of viaducts could be pushed with safety, this special line of investigation having reference to a proposed bridge with piers 400 feet in height and 140 feet of base. The idea of the great tower followed, preliminary plans were prepared, and calculations made by two of M. Eiffel's principal engineers,—MM. Nouguier and Koechlin,—and by M. Sauvestre, architect. Naturally, the leading principle followed was that adopted by M. Eiffel in all his lofty structures; namely, to give to the angles of the tower such a curve that it should be capable of resisting the transverse effects of wind-pressures, without necessitating the connection of the members forming these angles, by diagonal bracing. The Eiffel Tower, therefore, consists essentially of a pyramid composed of four great curved columns, independent of each other, and connected together only by belts of girders at the different stories, until the columns unite towards the top of the tower, where they are connected by ordinary bracing. Iron, and not steel, was used in the construction throughout.

MENTAL SCIENCE.

Psychic Cures.

OUR first record of the practitioners of the healing art describes them as invested with the priestly function, thus making the cure of physical ills a result of intellectual and religious influence. When reading the records of the past in the light of modern knowledge, we can trace almost at every point the very marked influence of mental states in the cure, sometimes described as miraculous, of disease. The repute of drugs altogether harmless, or of the physician who gave the drug, is often due to the successful action of the patient's own belief upon his susceptible system. And quite as truly are the wonderful cases of the infliction of ills by